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## Abstract View

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## A Numerical Model of Coastal Upwelling

**James J. O'Brien and H.E. Hurlburt**

*National Center for Atmospheric Research, Boulder, Colo. 80302*

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### ABSTRACT

A wind-driven model of coastal upwelling induced into a stratified, rotating ocean is solved numerically. The circulation is on an  $f$  plane and longshore variations are neglected. A multilevel model is derived, but only solutions for a two-layer model are discussed. A longshore baroclinic surface jet is discovered. The time-dependent geostrophic jet is dynamically explained by conservation of potential vorticity. The existence of the jet depends critically on stratification and non-zero wind stress at the coast. Coastal upwelling is confined to within 30 km of the shore. The model exhibits no deep countercurrent during active coastal upwelling. A time scale of the order of 10 days or longer is required for a pycnocline at 50 m depth to penetrate the surface. Solutions for a wide (>300 km) coastal shelf, an irregular shallow shelf, and a continental slope region are illustrated. A secondary upwelling region is found offshore at sharp breaks in the shelf topography. In all cases, the offshore flow is a simple Ekman drift and downwelling offshore is created by Ekman pumping caused by negative wind-stress curl.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693

DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826

[amsinfo@ametsoc.org](mailto:amsinfo@ametsoc.org) Phone: 617-227-2425 Fax: 617-742-8718

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